

SYNOPSIS OF THE FISHES OF LAKE NICARAGUA.

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During the spring of 1876, Dr. Bransford devoted some attention to the fishes of Lake Nicaragua while engaged in official duties under instructions from the Secretary of the Navy. The result of his labors was a collection of twenty-one species, of which seven are new to science, and several others have been for the first time definitively added to the fauna. The following article is an enumeration of the species collected as well as those otherwise known as inhabitants of the lake. The responsibility of the determination of the species rests chiefly with Dr. Gill.

Lake Nicaragua is distant from the Atlantic Ocean, at its nearest point, some sixty-five miles in an air line; while in the neighborhood of Rivas it approaches within ten miles of the Pacific. It extends in a northwest direction from its outlet at San Carlos, about a hundred and ten miles, with a maximum width of forty. A depth of 125 feet was obtained by Com'dr Lull's survey.

Except in the valley of the San Juan, the land between the lake and the Atlantic is higher and rougher than between it and the Pacific Ocean. Mean high water in the lake is above high tide in the Pacific—103.14 feet; and above mean tide in either ocean 107.63 feet. The lowest summit elevation on the west side is 43.78 feet above mean high water in the lake. This is about five miles from the lake, on the Rio Lajas route. A surface of eight thousand square miles is drained into this basin, which discharges at a minimum in the dry season 113.90 cubic feet per second, through its only outlet the San Juan River. The river is 119 miles long, and has five series of sharp rapids. The lake furnishes the inhabitants of its shores with water excellent for drinking. It is stocked with fish of great variety, from the little *Chirostoma* up to the shark and sawfish.

Most of the fish are excellent for table use. They are usually taken with a cast net, frequently at night, or with a hook and line. The sardines, as they are called, the *Chirostomæ* and *Pacilia*, are taken in weirs made of the branches of trees; and sometimes girls sitting on the rocky shore scoop them in with

twigs as the swell throws them into the pools and passages among the rocks. Squier thus describes the fisheries in the neighboring lake of Managua:¹ "At one point bushes were planted in the lake, like fish-weirs, between which women were stationed with scoop-nets, wherewith they laded out myriads of little silvery fishes, from the size of a large needle to that of a shrimp, which they threw into kettle-shaped holes, scooped in the sand, where, in the evening light, leaping up in their dying throes, they looked like a simmering mass of molten silver. These little fish are called sardinas by the natives, and are cooked in omelets, constituting a very excellent dish." "The first travellers in Nicaragua mention this novel fishery as then practised by the aborigines, and it has remained unchanged to the present hour."

Crabs are abundant along the banks of the lake; and turtles come ashore in great numbers, at certain seasons, to deposit their eggs.

Six years after the discovery of Nicaragua by Gil Gonzalez de Aviola, the old Spanish Chronicler Oviedo resided for some time in this region, and a few years later wrote a most valuable account of the country, its inhabitants, and productions. The following is a somewhat free translation of extracts relating to fish from his work:—

"There are in this lake (or these lakes, if you think there are several) many and good fish. But I believe it to be one single lake, and there is a good reason for it, which is that it contains very large sea fish, and from the sea they come into it, such as sharks and many alligators and cockatrices. And what confirms and affirms my belief that it is only one lake and in communication with the sea, is that in the year 1529 I found on the coast of this lake, lying on the beach, in the Province of Nicaragua, a dead fish that the waters must have thrown out, and which no man ever saw or caught but in the sea; it is called the sword fish, the one that carries a high snout at the extremity of the upper jaw; that ferocious sword full of sharp-edged teeth (on both edges) closely spaced. And this one I found dead, out of the lake, must have come into it by said outlet, and, although over 12 feet long, it was small, because the sword was small, not more than one palm and three fingers long, and not wider at the root, the widest part,

¹ Squier's Nicaragua, v. I, p. 412.

than two fingers. There is a great variety of fish, and the water is good and healthy, not very light nor heavy." (Vol. iv. page 63.)

"The common food of the Indians, and one they are very fond of, is the river and sea fish; they are very skilful in fishing and in the artifices they use for the purpose. And as some use fishing rods in Spain, the Indians in the same way fish with long and flexible poles well adapted for the purpose, and with line and bows, and more commonly with well-made cotton nets; and also with inclosures and partitions built in the shape of palisades, and from their canoes or boats. And they also employ a certain herb called *baygua*, which, thrown in the water, intoxicates the fish and after a short time they come to the surface lying on their backs asleep or stunned; and the people take them with their hands in large quantities. This *baygua* is similar to *bexuco*."

"But besides the fish thus taken from the rivers, they catch large quantities of them in the manner I stated hereinbefore. And it is my belief that these fishes from this country are healthier than those from Spain, because they contain less phlegm, but they are inferior in taste, though here are some very good; such as small and large *lisas*, *jureles*, *bemujuelas*, *mojarras*, *guabinas*, *palometas*, *bihabacas*, *sávalos*, *robalos*, *parquetas*, *caçones*, *sardinetus*, *cornudas*, *pulpos*, *tollos*, *corbinitas*, *agujas*, *linguados*, *açedias*, *salmonades* (I do not mean salmon), *hortias* (oysters), *almejas* (clams), and shell-fish of many kinds; *langostas* (lobsters), *cancrejos* (crabs), *jaybos*, *camurones* (shrimp), *rajos*, many and in some places very large; *anguilas* (eels), *morenas* (murænas) numerous and very large; *tiburones* (sharks), *lobos marinos* (sea lion), etc." (Vol. i. p. 424.)

"They fish with poles, in imitation of the fishing rod used in Spain, and with lines. I say they learned this way of fishing from the Christians, because the Indians had no fish-hooks. Leaving out these two ways of fishing from those I have mentioned, they used to fish constantly in other manners, and also with *judrias* and with a kind of trap, in the rivers." (Vol. i. p. 425.)

The worthy chronicler must not be judged too harshly for his assumptions respecting the communicability between the sea and lake, because of the presence of sawfish and other marine types. In our days naturalists have based hypotheses and classifications upon even less data and in spite of known facts.

The earliest of the historians of Nienragua was also the most full and satisfactory in his account of its fishes. Later travellers

have not added materially to the ichthyography of the country, and the allusions to the fishes made by Belt, Stout, Boyle, etc., it is unnecessary to recapitulate; they have chiefly adverted to the presence of sharks in the lake; the existence of the sawfish has even by Squier been regarded as apocryphal.

Almost all of our knowledge of the fish fauna of the lake has in fact been gained within the last twelve or thirteen years. With the exception of vague allusions to the fishes referred to, nothing had been published respecting them till the year 1864.

In 1864, in the fifth volume of the "Catalogue of the Fishes in the British Museum" (page 125), Dr. A. Günther described a species of Siluria under the name *Pimelodus nicaraguensis* (= *Rhamdia nicaraguensis*) presented by Capt. J. M. Dow.

In 1864, also, in a "Report of a Collection of Fishes made by Messrs. Dow, Godman, and Salvin, in Guatemala" (Proc. Zool. Soc., London, for 1864, pp. 144-154), Dr. Günther introduced four new species, viz.: *Eleotris longiceps* (= *Philypnus longiceps*), *Heros citrinellus*, *Heros nicaraguensis*, and *Heros Dovi*, all of which had been obtained by Capt. Dow from the lake.

In 1866, in the sixth volume of the "Catalogue of the Fishes in the British Museum," Dr. Günther made known two species of Cyprinodonts, viz.: *Gambusia nicaraguensis* and *Pæcilia Dovi*, both of which, like all the previously described species, were due to Capt. Dow.

Finally, in 1868, in "An Account of the Fishes of the States of Central America, based on collections made by Capt. J. M. Dow, J. Godman, Esq., and O. Salvin, Esq." (Trans. Zool. Soc. London, v. 6, pp. 377-494, pl. 63-87), Dr. Günther introduced still another new species of *Heros*—*Heros longimanus*.

In the same memoir (p. 405) Dr. Günther also gave a full list of the fishes so far received from the lake, which then numbered nine species, and contrasted them with those from other hydrographic basins, viz. :—

"E. Lake of Nicaragua.—Also the fishes of this lake are, with two exceptions, peculiar; like Lake Managua, it appears to have been part of a marine channel.

<i>Eleotris longiceps.</i>	} <i>Heros labiatus</i> (Lake of Managua)
<i>Heros longimanus.</i>	
----- <i>citrinellus.</i>	
----- <i>dovi.</i>	
----- <i>nicaraguensis.</i>	
	<i>Pimelodus nicaraguensis.</i>
	<i>Gambusia nicaraguensis.</i>
	<i>Pæcilia dovi</i> (in common with Lake Amatitlan)."

The element of especial interest in connection with the ichthyic fauna of the lake, is the association of forms that we are in the habit of regarding as characteristically marine with those that are at least as exclusively fresh-water types. Thus, with the species of Cichlids and Characinids, of which no representatives have been found in marine waters, we have a species of *Megalops*, a shark, and a sawfish. The association of the Plagiostomes in fresh water is not, however, unique. As has long been known, a similar instance of combination occurs in the Philippine Islands. "Near Manila," says Mr. W. W. Wood,¹ "is the Laguna de Baij, a large sheet of water some ninety miles in circumference, divided by an island and two peninsulas, from which it is often spoken of as the lakes. This lagoon receives the waters of the small rivers of the provinces of the Laguna and Morong, and its only outlet is the river Pasig, which flows with the bay between the military city and suburbs of Manila." "The water of the lake is quite fresh, and, after settling, perfectly potable." In this lake are found a sawfish, which, according to A. B. Meyer,² is specifically identical with the *Pristis Perottii* of the sea, and a shark which has not been specifically identified, but which is said to be "a small species of dog-fish, and quite harmless." It is also known to naturalists that sharks frequently ascend to a considerable distance up rivers, and that in large rivers, especially several in South America, species of rays, not known to occur elsewhere, are found.

The *Megalops* has not hitherto been known to occur in bodies of fresh water so isolated from the sea as is Lake Niaragua.

These instances, supplemented as they are by many others, are sufficient to convey a caution against too extensive generalization of the physiographical conditions hinted at by fossil remains of aquatic types.

The why and wherefore of such combinations of species are not entirely apparent. They may have resulted (1) from the intrusion of the salt-water types into the fresh waters, or (2) from the detention and survival of the salt-water fishes in inlets of the sea that have become isolated and gradually become fresh-water lakes. On the whole, it appears more probable that the latter is the case. By the uplift of the land, an inlet of the Pacific Ocean might have been shut off from communication from

¹ Nature, xiii. p. 107, 1875.

² Nature, xiii. p. 167, 1875.

the ocean, and the character of the water would be soon changed by the copious showers of that tropical country. The shark, saw-fish, megalops, and other species mostly found in the sea, had, however, time to accommodate themselves to the altered conditions, and in this connection it must be remembered too, that most of the types in question are known to voluntarily ascend high up streams and even into fresh water. The numerous rapids of the river discharging from the lake discourage, however, the idea that the species enumerated have voluntarily ascended that river and entered the lake. The concurrence of the fresh-water fishes with the others and their entrance into the lake from the surrounding streams would be merely a question of time.

With these remarks we close, and preface the descriptive portion with a list of the species enumerated.

GOBIDÆ.

Philypnus longiceps.

CICHLIDÆ.

Heros rostratus.

longimanus.

labiatus.

citrinellus.

basilaris.

Dovii.

nicaraguensis.

balteatus.

centrarchus.

Næctroplus nicaraguensis.

ATHERINIDÆ.

Chirostoma guatamalensis.

CYPRINODONTIDÆ.

Gambusia nicaraguensis.

Pœcilia Dovii.

CLUPEIDÆ.

Opisthonema libertatis.

ELOPIDÆ.

Megalops ———.

CHARACINIDÆ.

Chalcinopsis dentex.

Bramocharax Bransfordii.

SILURIDÆ.

Rhamdia nicaraguensis.

PRISTIDÆ.

Pristis antiquorum ?

GALEORHINIDÆ.

Eulamia nicaraguensis.

GOBIIDÆ.

Philypnaus longiceps.

Eleotris longiceps, Gthr., Proc. Zool. Soc. London for 1864, p. 151.

————— Gthr., Trans. Zool. Soc. London, vol. vi. p. 440,
1868.

Two specimens were obtained, agreeing well with Günther's description of the species in question.

CICHLIDÆ.

Heros rostratus.

The form is that of the *Helleri* type. The back declines rather rapidly to the tail, and in front of the dorsal is slightly gibbous.

The height is contained two and one-third times in the extra-caudal length. The caudal peduncle is one-third higher at its base than long. Its greatest height bears to its length the ratio of 10 to 8. The head is acutely pointed, and the snout above, rectilinear. The length of the snout exceeds half that of the head. The inter-orbital area is nearly flat. The preoperculum and cheeks are very oblique. The buccal scales are in six rows. The jaws are normally developed. The superior maxillary terminates at a vertical a little nearer the eye than the snout, and the articulation of the lower jaw is also notably in advance of the eye. The lips are moderately developed, and the lower ones separated by a broad frænum at the middle.

The dorsal fin is well developed; the anterior spines are rapidly graduated, the rest subequal; the soft rays, when bent back, extend a little beyond the basal third of the caudal. The anal fin commences under about the twelfth dorsal spine; its first four spines rapidly increase, and its last two moderately; the soft part, when bent back, extends a little beyond the basal fourth of the caudal. The caudal enters four and one-third times in the extreme length, and is subtruncate, but slightly emarginated in the middle. The pectoral fins are well developed, and extend about as far backwards as the first anal rays. The ventral fins have filamentary rays which extend backward to the last anal spine.

The color is a bronzed olive indistinctly crossed, at least in the young, by two bands, one under the dorsal, and the other below its last rays; later, these fade out more or less, leaving, of the first, only a rather indistinct dorsal saddle under the median spines, and of the second, a distinct black spot below the lateral line. A black spot also exists at the base of the caudal fin, mostly above the lateral line. The breast and lower surface of the head bronzed or blackish towards maturity.

The dorsal at its spinous part is dusky and immaculate, but in its soft portion diversified by dusky areas in three or five rows, separated by narrow light interspaces. The anal is more nearly uniform, but still has a few light spots. The caudal is reticulated by bright interspaces on a dusky ground. The pectorals are spotless. The ventrals dusky.

This species is quite characteristic in the extension of the rostrum, and is thus readily distinguished from at least any of the Nearaguan species, if not from any yet made known. It is apparently most nearly related to the *Heros affinis* (Günther), of Lake Peter. Eleven specimens of various sizes were obtained by Dr. Bransford.

Heros longimanus.

Heros longimanus, Gthr., Trans. Zool. Soc. London, v. VI. p. 453, pl. 72, fig. 2, 1868.

But one half-grown specimen was obtained by Dr. Bransford.

Heros labiatus.

Heros labiatus, Gthr., Proc. Zool. Soc. London, for 1864, p. 27, pl. 4, fig. 1, 1864.

Heros labiatus, Gthr., Trans. Zool. Soc. London, v. VI. p. 456, 1868.

Heros citrinellus.

Heros citrinellus, Gthr., Proc. Zool. Soc. London, for 1864, p. 153, 1864.

Heros citrinellus, Gthr., Trans. Zool. Soc. London, v. VI. p. 459, pl. 71, fig. 1, 1868.

Four specimens were obtained, which apparently belong to this species, although none exactly agree with the description or figure published by Dr. Günther.

Heros basilaris.

The form is that of the *Margaritifera* and *Citrinellus* type. The back declines moderately to the tail, and is regularly decurved in front of the dorsal fin; the height is contained two and one-third times in the extra-caudal length; the caudal peduncle is not

much higher at its base than long, and it decreases very gradually to the fin; the head is normal, and the snout above convex and blunt in front, the length of the snout is little more than a third the length of the head; the interorbital area is slightly raised; the preoperculum is nearly vertical; the buccal scales are in four rows; the jaws are normally developed; the supra-maxillary terminates at a vertical, very little in advance of the orbit; the lips are moderately developed, and are free all around; the teeth of the outer row are of rather large size; the dorsal fin is moderately developed; the anterior spines are normally graduated, the rest subequal; the soft rays when bent back extend nearly to the terminal third of the caudal; the anal fin commences under the thirteenth dorsal spine, its first three spines are rapidly, and the succeeding moderately, graduated; the largest soft rays, when bent back, reach the second third of the caudal; the caudal enters four and a third or four and a half times in the extreme length, and its margin is convex-truncate; the pectoral fin extends to the vertical of the third and the ventral fin to that of the fourth or fifth anal spine.

D. xvi. 12. A. vii. 8.

The color is bronzed-olive, with (in the young, at least) seven bands; in the fourth band is developed a distinct blackish spot just under the lateral line, and on the base of the caudal fin, above the lateral line, is another, but smaller, blackish spot; the dorsal and anal fins are dusky, but the soft parts much darker at the base than on the rest of their fins and surface; the caudal fin is also much darker at its basal third than behind; the pectoral and ventral fins are dusky and uniform, save that the filamentary rays of the ventrals are darker.

The species is quite nearly related to a number of species, and, among the Nicaraguan ones, next to the *Heros longimanus*, but its combination of characters sufficiently differentiates it as a distinct species from any previously well characterized. It is one of the most abundant species of Lake Nicaragua.

Heros dovii.

Heros dovii, Gthr., Proc. Zool. Soc. London, for 1864, p. 154, 1864.

Heros dovii, Gthr., Trans. Zool. Soc. London, v. VI., p. 461, pl. 73, fig. 4, 1868.

No specimens were obtained by Dr. Bransford.

Heros nicaraguensis.

Heros nicaraguensis, Gthr., Proc. Zool. Soc. London, for 1864, p. 153, 1864.

Heros nicaraguensis, Gthr., Trans. Zool. Soc. London, v. VI., p. 465, pl. 77, fig. 1, 1868.

No specimens are in Dr. Bransford's collection.

Heros balteatus.

The form is that of the *Godmanni* type; the back declines rather slowly, and in a gentle curve to the tail, and in front of the dorsal is boldly decurved to the forehead; the height is contained rather more than two and a half times in the extra-caudal length; the caudal peduncle is little higher than long, and gradually diminishes to the tail; the head is abbreviated and the snout convex above and almost sub-truncated in front; the length of the snout enters two and a half times in that of the head; the inter-orbital area is flat; the preoperculum mostly vertical, but convexly protuberant at the angle; the buccal scales are in five rows; the jaws are normally developed; the supra-maxillary terminates at a vertical in front of the orbit; the lower lip is indicated by an obsolete fold wanting towards the symphysis; the teeth in the outer row are moderately enlarged; the dorsal fin is slightly developed; the anterior spines are rather slowly graduated, and the rest sub-equal; the longest soft rays, when bent back, extend to the terminal half of the caudal; the anal fin commences under about the fourteenth dorsal spine; the spines at first rapidly and then gradually increase in length backwards; the longest soft rays, when bent back, reach the second third of the caudal fin; the caudal fin enters four and a third times in the extreme length, and is slightly emarginated; the pectoral fins reach backwards to the vertical of the third anal spine, and the filamentary rays of the ventral fins extend to the fourth or fifth anal spine.

D. xviii. 10. A. vii. 7.

The color (in spirits) is yellowish-orange; a rather broad black band extends from the post-ocular region across the operculum and shoulder, along the flanks to the spot at the base of the caudal fin. The back in front of the dorsal has also a blackish spot, and under the base of the dorsal fin are more or less defined dark areas or spots; the dorsal fin is dusky and immaculate, as are also the anal and caudal; the pectoral fins are yellowish at the base and dusky beyond, and the ventral have the outer rays dusky (but

with the edge of the external lighter) and the inner yellowish; the branchiostegal membrane below is orange or yellowish, and the breast slate-colored.

This is also an abundant and characteristic species. Of the previously known Nicaraguan species it seems to most resemble the *Heros nicaraguensis*, but is so decidedly distinct as to need no special comparison.

Heros centrarchus.

The form is of the *Multispinosus* type; the parts above and below the longitudinal axis are nearly equally balanced; the back declines moderately in a curve towards the tail and in front of the dorsal is slightly, but regularly deurved towards the forehead; the height is contained twice in the extra-caudal length; the caudal peduncle is very short, its height at the root being twice as great as it is long, and it comparatively rapidly narrows to the caudal; the head has the forehead slightly gibbous, and the snout is rectilinear and pointed in front; the length of the snout is little more than a fourth of that of the head; the interorbital area is slightly raised; the preoperculum is nearly vertical and at the angle boldly rounded; the buccal scales are in five rows; the jaws are normally developed; the supramaxillary terminates at a vertical about a pupil's length in advance of the eye; the lips are moderately developed and the lower is interrupted in front; the teeth of the outer row are rather strong; the dorsal fin is moderately developed; the dorsal spines increase in a regular, bold curve from the first to the sixth, and the following are nearly equal; the longest rays bent backwards extend for the length of the basal half of the caudal; the anal fin is very long and commences under the ninth dorsal spine; the spinous portion is not much less than three times longer than the soft; the first three spines are rapidly graduated and the following ones nearly equal; the longest soft rays reach backward to the terminal half of the caudal; the caudal fin forms a quarter of the extreme length, its angles are round and the posterior margin slightly emarginated; the pectoral fin extends backwards nearly to the vertical of the fifth or sixth anal spine; the ventral fins also reach to nearly the same point.

D. xvi. + 8; A. x. + 9.

The color is bronze-olive, with seven indistinct cross-bands; at the base of the tail is a faint spot chiefly above the lateral line; the fins are dusky and emaculate.

The species is related to the *Heros multispinosus*, but is distinguished sufficiently by the characters specified in the description. The specimen preserved at least is entirely destitute of the distinct longitudinal band which characterizes the *H. multispinosus*, and is also distinguished by a slight gibbosity above the orbit which contrasts with the straight profile of the older species.

But one specimen was procured. Both in physiognomy and in the number of the anal spines it resembles the genus *Centrarchus* of North America, and, hence, the name is very appropriate, inasmuch as it serves to recall this resemblance as well as to indicate the great number of spines. The group of which it is a representative may receive the subgeneric name of *Archocentrus*.

***Neötropus nicaraguensis*.**

The form is almost entirely that of *Neötropus nematopus*; the back declines equally slowly backwards, but in front of the dorsal falls in a more regular convex line to the forehead; the height equals two-fifths of the extra-caudal length; the caudal peduncle is slender, and its length equals the height; the head is short, and the snout convex forwards and subtruncated in front; the length (or depth) of the snout equals nearly half that of the head; the interorbital area is convex; the preoperculum moderately oblique; the supra-maxillaries terminate at a vertical about a pupil's length in advance of the orbits; the lips are moderately developed, the lower interrupted by a broad isthmus in front; the dorsal spines increase in a bold curve from the first to the fifth and the rest are subequal; the soft rays, when bent back, reach nearly to the terminal half of the caudal; the anal fin commences about under the fourteenth dorsal spine; the first three spines rapidly increase, the succeeding slower; the longest rays reach to the second third of the caudal fin; the caudal fin forms about a fourth of the extreme length and its posterior margin is truncated; the pectoral fin extends to about a vertical with the anus; the ventral fin to about the third or fourth anal spine, the filament of the external ray being moderately produced.

D. xviii. + 11; A. vii. + 7.

The color is olive-brown, and almost uniform. The fins are also uniform save that, perhaps, the soft portion of the dorsal and anal are darker at the base.

The species is very closely related to the type and hitherto only known species of the genus *Neötropus* (*N. nematopus*), but is

distinguished by the simple convex forehead, and the more truncated snout, the truncated caudal, the less elongated ventral filaments, and the uniform color of the operculum. Three specimens were obtained.

ATHERINIDÆ.

Chirostoma guatemalensis.

Atherinichthys guatemalensis, Gthr., Proc. Zool. Soc. London, for 1864, p. 151, 1864.

Gthr., Trans. Zool. Soc. London, v. VI., p. 443, 1868.

Nine specimens were obtained which doubtless belong to this species, although they do not entirely agree with the description, which, however, is too brief.

CYPRINODONTIDÆ.

Gambusia nicaraguensis.

Gambusia nicaraguensis, Gthr., Cat. Fishes B. M., v. VI., p. 336, 1866.

Gthr., Trans. Zool. Soc. London, v. VI., p. 483, pl. 82, fig. 3 (fem.), 1868.

Known only through the description and figure published by Dr. Günther.

Pœcilia Dovii.

Verified Synonymy.

Pœcilia Dovii, Gthr., Cat. Fishes B. M., v. VI., p. 344, 1866.

Possible Synonymy.

Gambusia plumbea, Troschel, Reise Mex. von Müller, v. III., p. 106.

Five specimens were obtained.

CLUPEIDÆ.

Opisthomena libertatis.

Meletta libertatis, Gthr., Proc. Zool. Soc. London, for 1866, p. 603, 1867.

Clupea libertatis, Gthr., Cat. Fishes B. M., v. VII. p. 433, 1868.

Gthr., Trans. Zool. Soc. London, v. VI., p. 487, 1868.

Two small specimens were obtained.

ELOPIDÆ.

Megalops ———.

The *Megalops* is a most beautiful fish, with olive-green back, and sides frosted with silver. The specimen, of which only two scales were preserved, sprang upon the deck of the river steamer while going down the Toro Rapids—the first set after leaving the lake.

While here in 1873, one that weighed 62 lbs. sprang into our boat. In March, 1873, while encamped at the head of the Toro Rapids, every evening, just before sunset, one of these magnificent fish came close under the grassy bank to play in the deep swift current. It would make its appearance, and, turning on its side, slowly sink and rise again. One evening I stood in wait with a harpoon, the blade of which, about eight inches long, was armed with four or five barbs, about an inch in length. On the fish's approach the harpoon was hurled and buried six inches in the flesh behind its shoulder. The terrified animal rushed down stream in a style that made our hands burn as the long line spun through. Three men were required to hold it, but in five minutes it was apparently exhausted and allowed itself to be hauled up near the bank. Two Indians were sent out in a canoe to land it, but when touched, it gave a convulsive spring, tearing away and leaving chunks of flesh on each barb. The flesh of this fish is rather coarse, but much eaten by the natives. (Bransford.)

CHARACINIDÆ.

Chalcinopsis dentex.

Brycon dentex, Gthr., Proc. Zool. Soc. London, for 1860, p. 240.

Chalcinopsis dentex, Gthr., Cat. Fishes B. M., v. V. p. 337, 1864.

Gthr. Trans. Zool. Soc. London, v. VI. p. 478, pl. 82, f. 2, 1864.

The height of the body is contained three and one-third times in the total length without the caudal; the length of the head is a little less than four times; the maxillary extends to a vertical with the front of the pupil of the eye; the snout is about as long as the eye; the interorbital space is convex, its width is nearly half as great again as the length of the snout; the dorsal fin has its origin nearer the base of the caudal than the extremity of the snout, and its posterior is above the anal; the free portion of the tail is considerably longer than high; the caudal fin is deeply forked; the pectoral fin extends nearly as far backwards as the base of the ventrals. The color is olive-brownish on the back, and silvery on the flanks and abdomen; the scapular arch is bordered with blackish; the dorsal fin is dusky; the anal fin forwards is also dusky towards the free margins.

Two specimens were collected, which, as will be seen from the above description, agree essentially with *Chalcinopsis dentex*, of Günther; but one of them is distinguished by a remarkable devi-

ation from the type in the development of the preopercular and buccal bones of one of the sides.

On the right side, the preopercular bone extends backwards over the interoperculum, and has an oblique posterior margin; the enlarged inferior, or buccal, suborbital bone is more than twice as long as high, and its posterior margin is oblique and parallel with that of the preoperculum; the post-orbitals are well developed and nearly contiguous. On the left side, the homologous bones present essentially the characteristics attributed to them in the figure published by Günther.

Genus **BRAMOCHARAX.**

Body elongated, compressed—fusiform, and with the belly, in front of the ventrals, rounded. Scales of moderate size, with entire margins, but very distinct radiating striæ on their exposed surfaces; lateral line moderately decurved and complete; head moderate, with a pointed slender snout and slightly incurved profile; sub-orbital bones well developed, and with the buccal and combined post-ocular ones subequal and enlarged; nostrils close together and separated only by membranous partition; mouth with the cleft moderately oblique and deep, extended at least below the anterior borders of the eye; teeth uni-serial on the jaws; those in intermaxillary, as well as dentary, being compressed and conical; those of the former moderate, and those of the latter enlarged, especially on each side of the symphysis; teeth of supra-maxillary extending along almost its entire edge, and small, compressed, and muticuspid or denticulate; branchial apertures ample, the branchiostegal membrane being deeply cleft and free from the isthmus; dorsal fin short and sub-median, being above the space between the ventrals and anal; anal fin moderately long, and restricted to the posterior half of the fish's length; pectorals moderate; ventrals abdominal, and inserted at nearly a head's length behind the head.

The genus thus defined, is, in brief, characterized by the physiognomy of an *Astyanax* or bream, combined with characteristics of the genus *Cynopotamus*, and technically, at least, it approaches nearest to the last-named group. Its distinctive features are found in the association of characters enumerated, especially the form, size of scale, dentition, moderately elongated anal, and position of the ventrals.

Bramocharax Bransfordii, Gill.

D. 11, A. 2 + 26, P. 16, V. 1 + 8.

The height is contained about two and three-quarters times in the length, exclusive of the caudal.

The head enters three and two-thirds times in the same length.

The eye is large, its diameter equalling a quarter of the head's length. The snout is somewhat longer than the eye, is attenuated, and projects slightly beyond the lower jaw. The superior maxillary bones are much decurved, and extend somewhat behind the centre of the eye.

SILURIDÆ.**Rhamdia nicaraguensis.**

Pimelodus nicaraguensis, Gthr., Cat. Fishes B. Museum, v. V., p. 125, 1864.

No specimens were secured by Dr. Bransford.

PRISTIDÆ.**Pristis antiquorum.**

A saw of the species of *Pristis* inhabiting Lake Nicaragua has been sent to the Smithsonian Institution by Dr. Flint, of Granada. It essentially agrees with those of the *Pristis antiquorum* in the collection of the Institution, although quite well marked individually. The lake-dweller may still prove to be a form differentiated specifically from its marine congener; there is, however, no sufficient reason for its determination from the saw.

GALIOSHINIDÆ.**Eulamia nicaraguensis.**

The snout is short and obtusely rounded; the distance between the mouth and the extremity of the snout is considerably less than (about four-fifths of) the interval between the inner angles of the nostrils; no labial fold is superadded to the groove at the angle of the mouth; the teeth are rather larger and less numerous than usual, e.g., $\frac{25}{25} = \frac{12 + 1 + 12}{12 + 1 + 12}$; the upper of these are nearly regularly triangular, scarcely notched on the posterior margin, and with both margins distinctly serrated; those in the lower have a broad two-rooted base, but narrow cusps which are very finely serrated on the margins; the first dorsal commences just behind the vertical from the inner axil of the pectoral fin,

and its vertical height about equals the snout at the line of the nostrils, and is considerably higher than long at its base; the second dorsal is somewhat larger than the anal, its base is about two-fifths as long as that of the first dorsal, while its height is about a third of that of the first; the pectoral fins are moderately developed, the greatest extent being considerably less than twice the height of the dorsal.

The shark of Lake Nicaragua cannot be identified with any of the previously-described forms, although closely related to *Eulamia Milberti* and the kindred species. The specimen described, when freshly caught, measured 6 feet 4 inches in length. The skin and jaws were preserved. Although, as indicated in the introductory remarks, it has long been known that a shark was an inhabitant of the lake, the relations of the species have been previously unknown, and the spoils obtained by Dr. Bransford are the first that have been subjected to scientific examination.

Larger specimens than that obtained might have been procured, but Dr. Bransford took the first caught. There are numerous well-authenticated cases of people having been killed by these sharks, and the natives are very careful to keep out of their way. Some six months before Dr. Bransford's arrival a man was bitten by one near the place where this specimen was taken. A great portion of one thigh and buttock was cut away, and he died from the effects. Repeated tales are told of similar incidents. Squier says: "Sharks abound in the lake. They are called tigrones from their rapacity. Instances are known of their having attacked and killed bathers within a stone's throw of the beach at Granada."¹ They are found throughout the length of the river San Juan, of sizes varying from a foot to over six feet in length. Sivers thinks that they come up the river from the sea.

¹ Squier's Nicaragua, vol. i. p. 196.